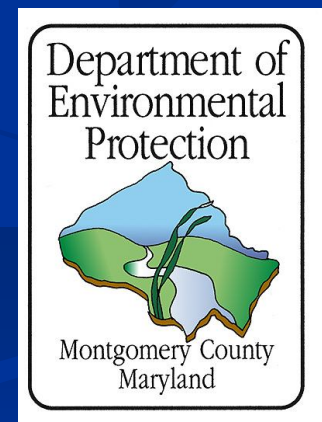


New Storm Water Treatment Devices Along Stewart / April Lane & Lockwood Drive

Doug Marshall, Watershed Planner



Montgomery County's MS-4 Permit (Municipal Separate Storm Sewer System)

- Required for County storm drain system under the EPA Clean Water Act
- Add stormwater management to currently unmanaged, developed areas
 - Treatment goal is additional 20% of impervious area (4100 acres) currently not treated to the maximum extent practicable (MEP)
- Meet commitments in Trash Free Potomac Treaty
- Increase use of Environmental Site Design (ESD) or Low Impact Design (LID)



Fernwood Road dry swales

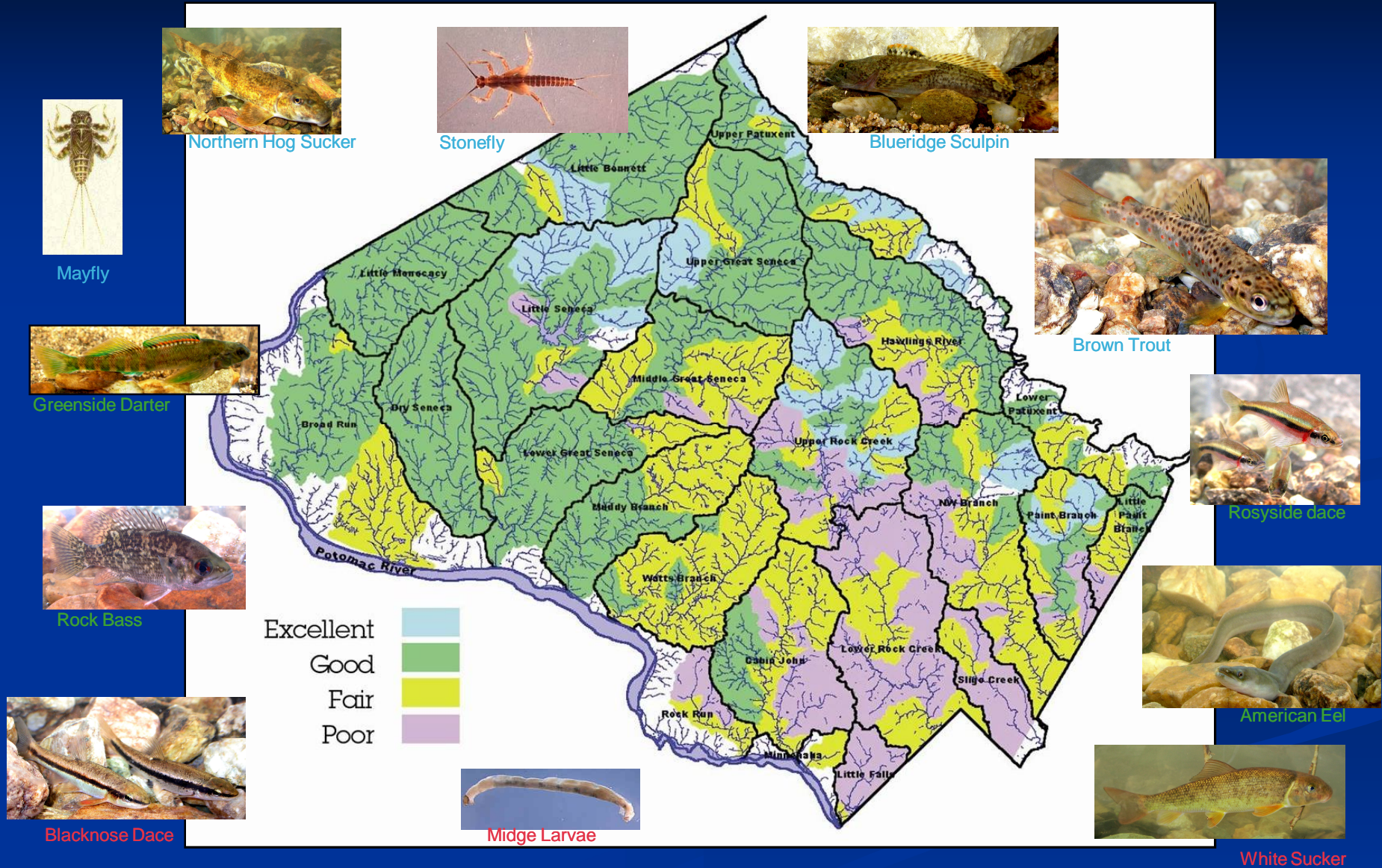


Good Hope pervious concrete sidewalk



Gaithersburg 'Green Street' retrofit

Stream Resource Conditions



There are over 1,500 miles of streams in Montgomery County which contain more than 50 fish species and over 300 aquatic insect taxa

The effects of urban runoff...



Threats to infrastructure



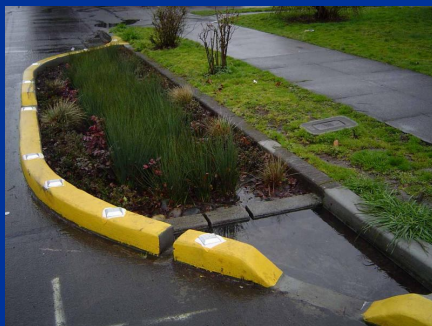
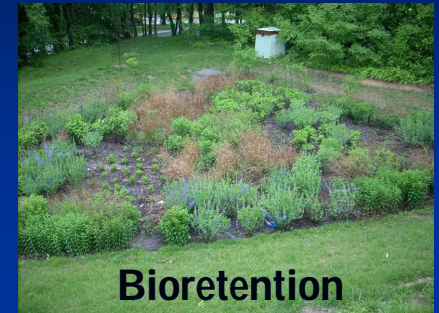
Down-cut and enlarged, shallow streams



What is LID & ESD?

Low Impact Design or Environmentally Sensitive Design

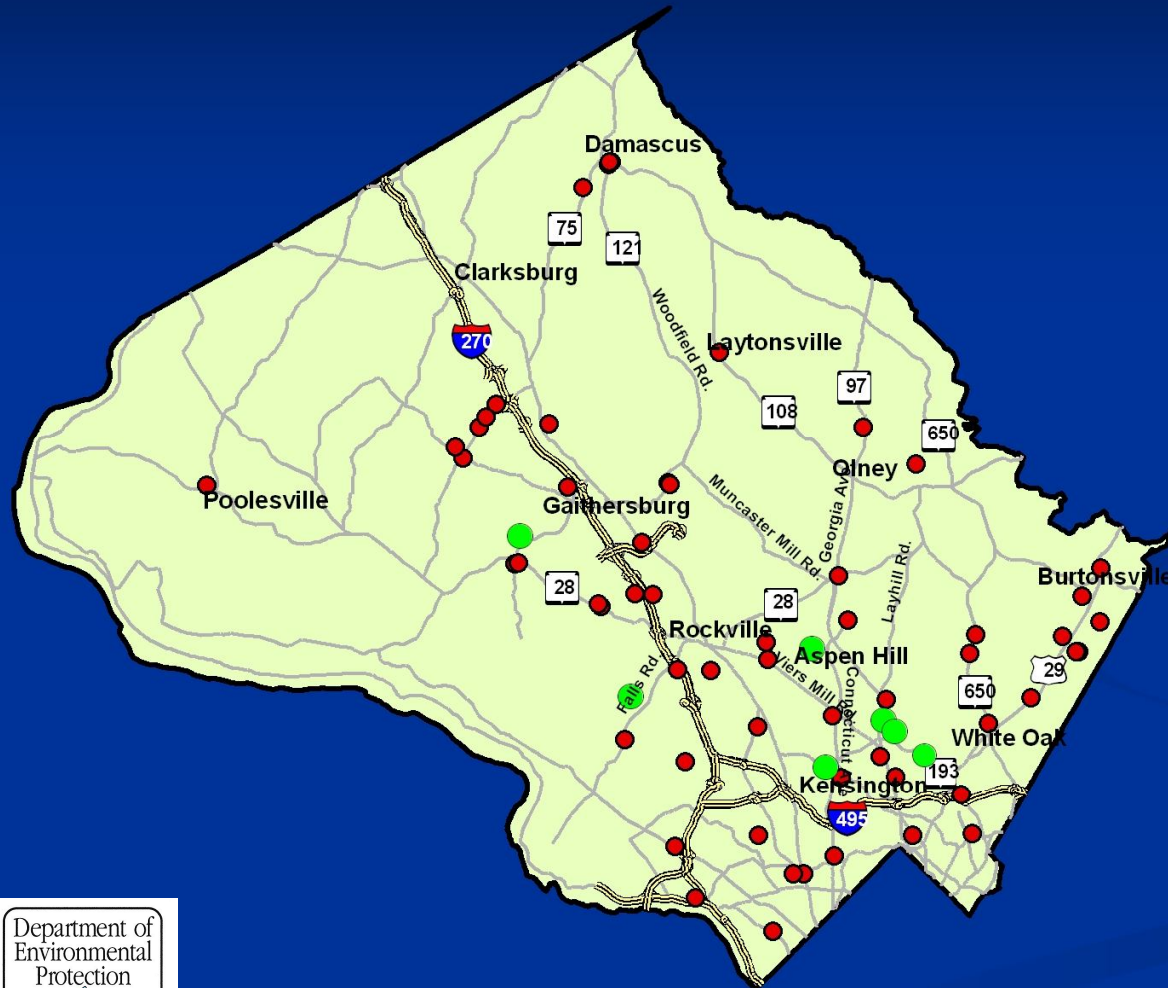
- Uses a variety small scale practices to capture stormwater runoff close to the source
- Slows down the rate of runoff
- Reduces the overall volume of runoff
- Provides filtration to remove pollutants from stormwater runoff
- Provides an opportunity for stormwater to soak into the ground, replenishing ground water.



Conventional Stormwater Approach



Public Facilities Assessed for LID Retrofit Opportunities



66 Sites Assessed

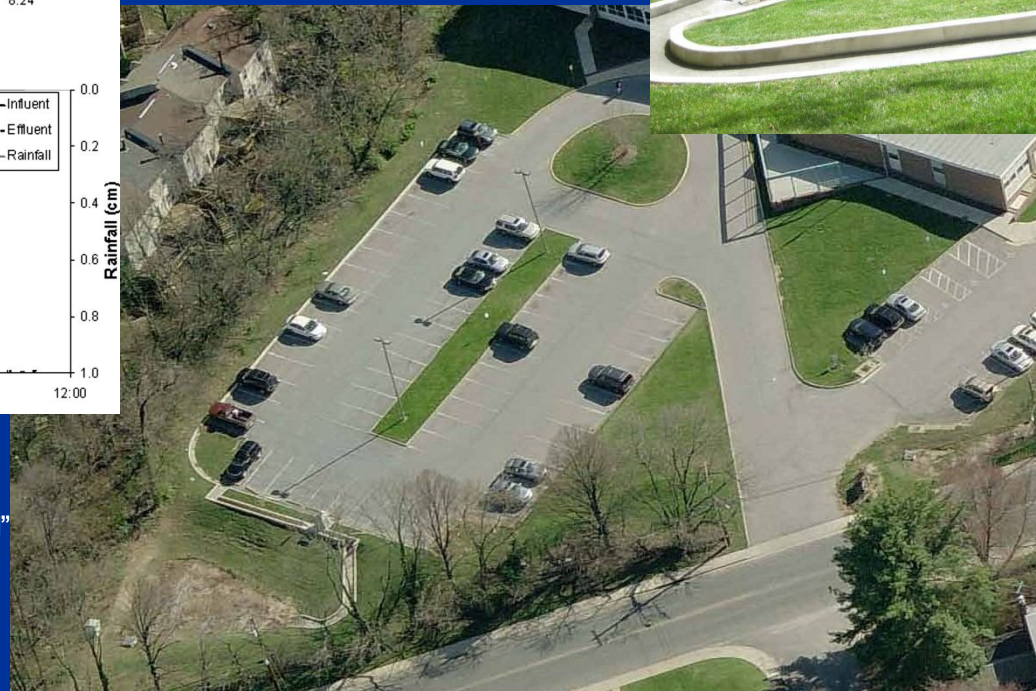
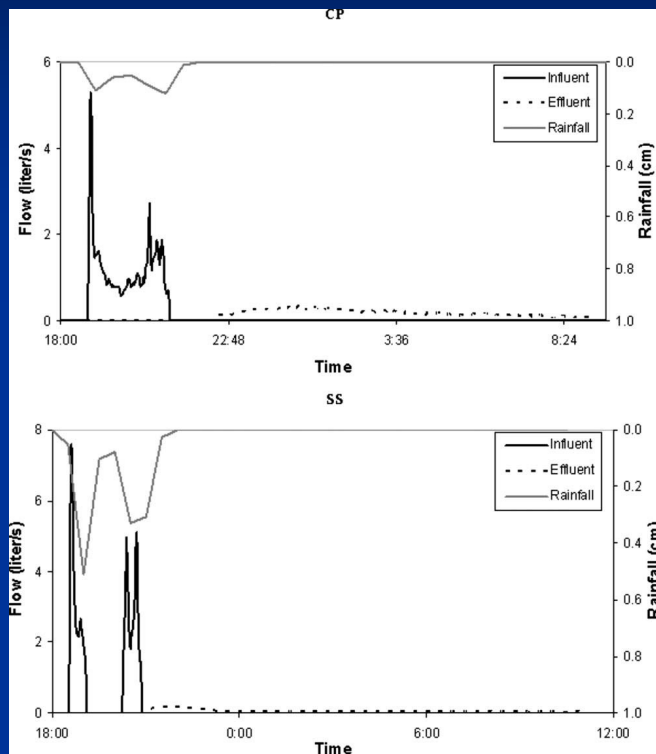
Libraries - 12
Community Centers - 11
Park & Rides - 10
Regional Service Centers - 9
Police Stations - 8
Fire Stations - 5
Pools - 3
Schools - 5
Roadways - 3

In Design (green circles)

Aspen Hill Library
Kensington Park Library
Cold Spring Elem. School
Ridgeview Middle School
Arcola Ave.
Amherst Ave.
Breewood Neighborhood

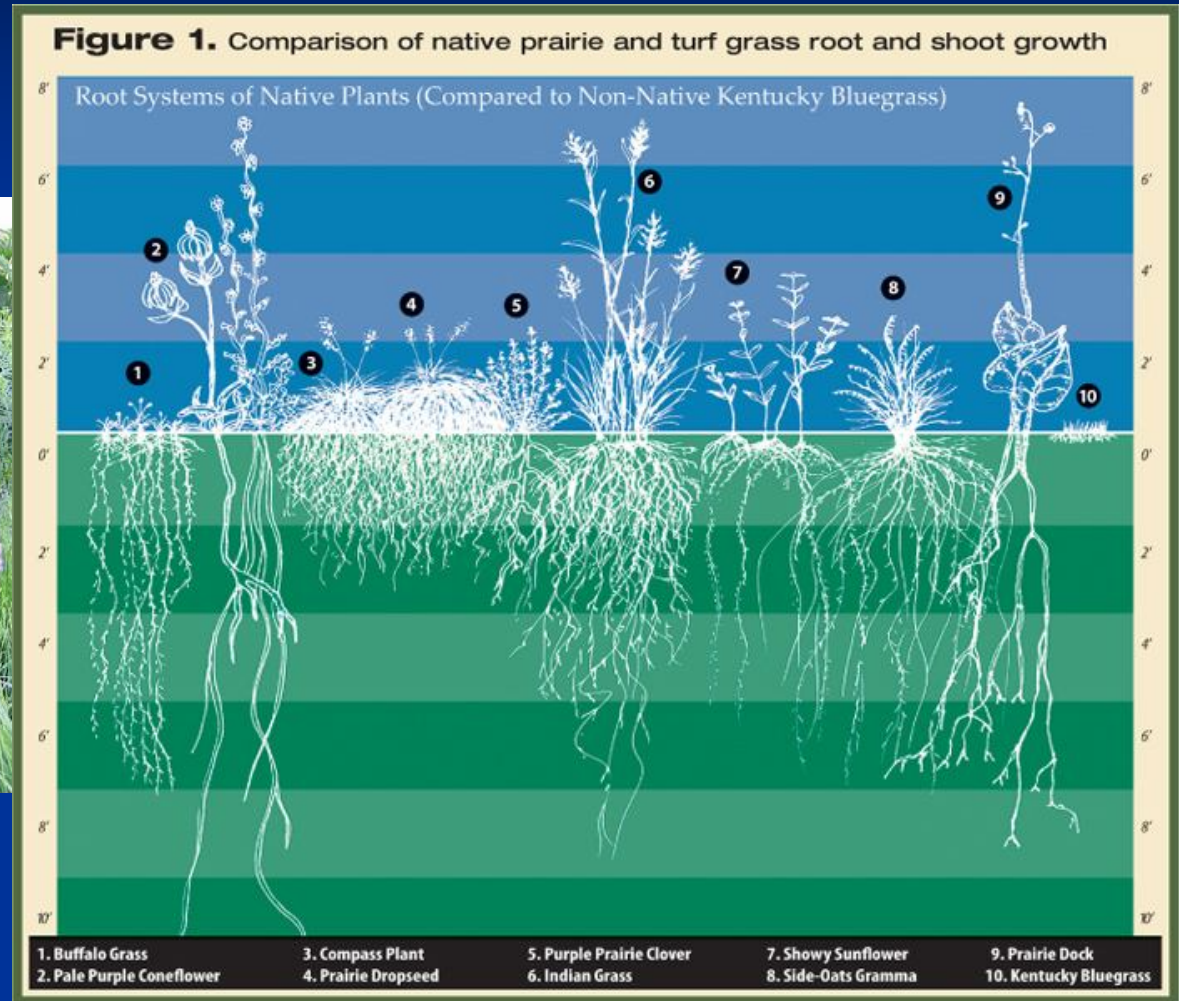
Bioretention Facility

Dennis Ave. Health Center



Davis, A. P., et. al. (2009) "Mitigation of Impervious Surface Hydrology Using Bioretention in North Carolina and Maryland" *J. Hydrologic Engineering*, April, 407-415.

Typical Mix of Bioretention Plants



Application of ESD / LID to Roadways

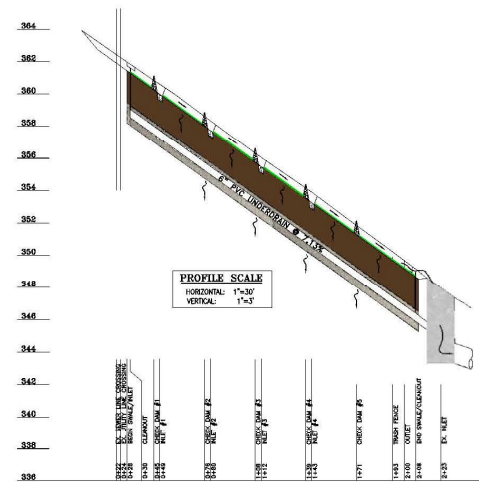
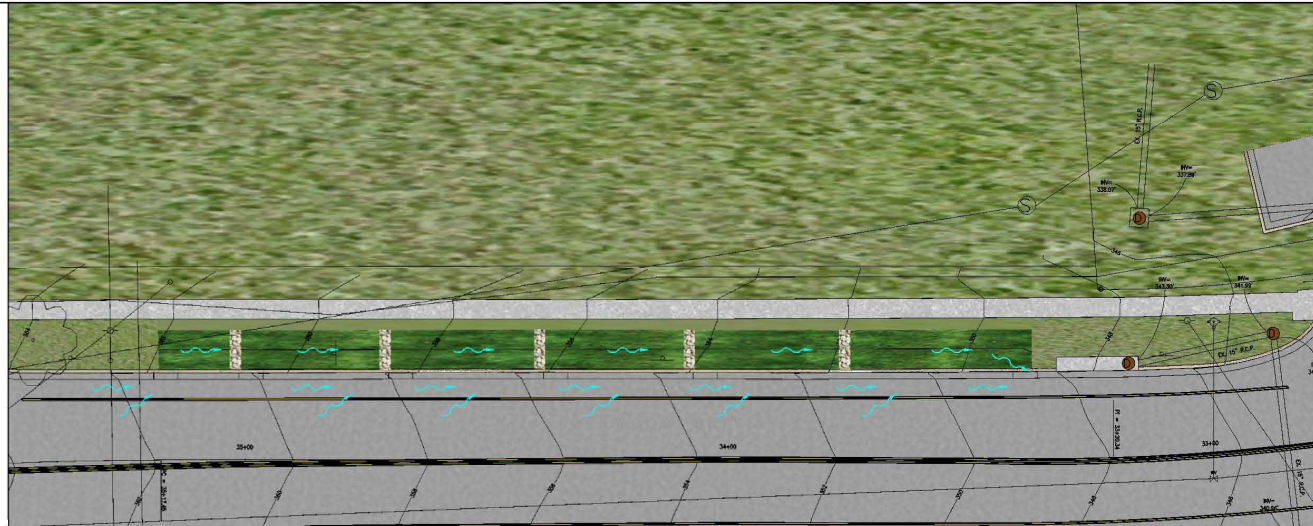
- Approximately 1/3 of impervious surfaces in Montgomery County are roadways
- Identification of demonstration projects
- White Oak is one of the 1st projects
- Others are under design
- Coordinating with County DOT to implement ESD / LID with major roadway repairs

Bioswales



Falls Grove Village Center –
near Shady Grove Hospital

Rendering of a Bioswale



FACILITY NO.21 RETROFIT
S1-SWALE WITH UNDERDRAIN & INTERNAL STORAGE

S1 - SWALE W/ UNDERDRAIN & INTERNAL STORAGE RETROFIT WHITE OAK RETROFITS COLESVILLE (5th) ELECTION DISTRICT MONTGOMERY COUNTY, MARYLAND			
CPJ Charles F. Johnson & Associates, Inc. <small>ARCHITECTS</small> Civil and Environmental Engineers • Planners • Landscape Architects • Surveyors 1000 BROADWAY, 10TH FLOOR NEW YORK, NEW YORK 10003-6600 www.cpj.com • Goldensburg, MD • Silver Spring, MD • Fairfax, VA			
10000 MONTGOMERY COUNTY DEPARTMENT OF ENVIRONMENTAL PROTECTION 10000 BROADWAY, 10TH FLOOR SILVER SPRING, MARYLAND 20910 CONTACT: JIM HARRIS	PREPARED BY: JFH CHECKED BY: JFH DATE: 11/11/09 SCALE: AS SHOWN	SHEET NO.: 1 OF: 1	FILE NO.: 10000-0000
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Bioswale Retrofit In Cloverly

Installed By MD-SHA For ICC Environmental Stewardship



Bioswale Retrofit Along Redmiles Road

Curb Extension



Siskiyou Green Street in Portland, Oregon



Portland, Oregon



Gaithersburg, MD

Curb Extensions in Montgomery County Used as Traffic Calming Devices



Connecticut Ave, Aspen Hill



Kemp Mill Rd, Wheaton

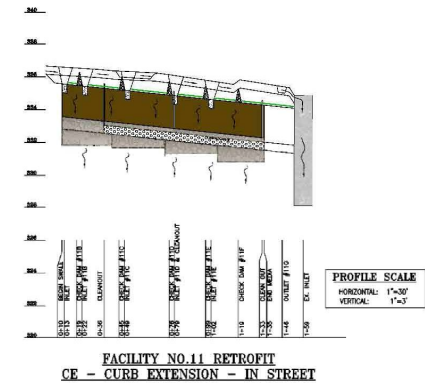
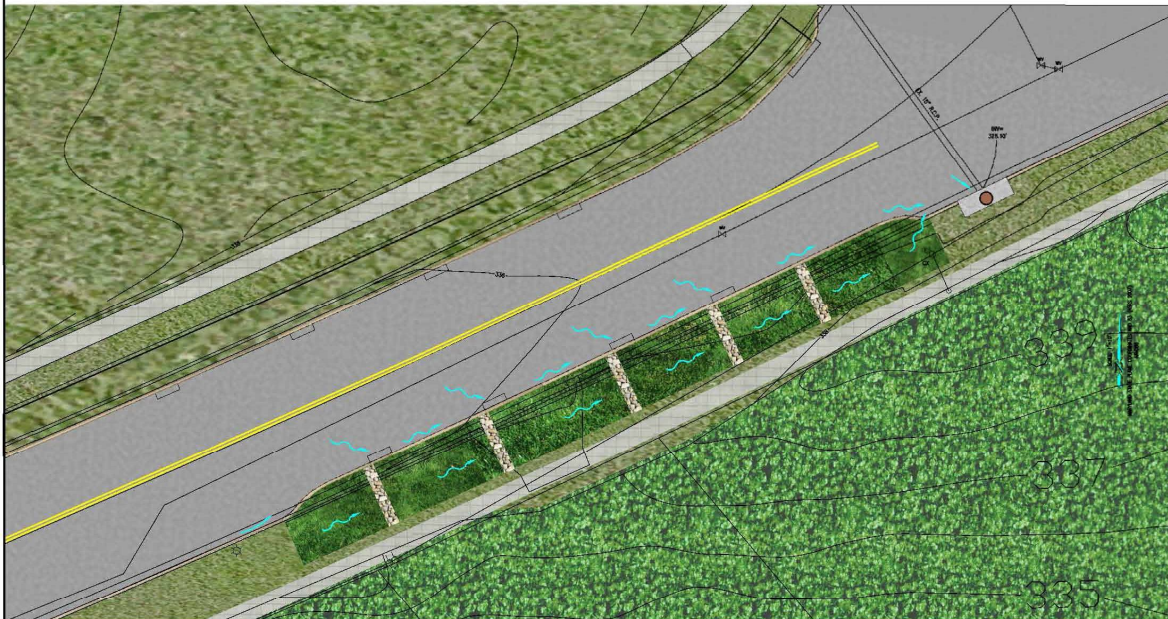


Huntington Pkwy, Bethesda



Huntington Pkwy, Bethesda

Rendering of a Curb Extension



FACILITY NO.11 RETROFIT
CE - CURB EXTENSION - IN STREET

CE - CURB EXTENSION - IN STREET RETROFIT
WHITE OAK RETROFITS
COLESVILLE (5th) ELECTION DISTRICT
MONTGOMERY COUNTY, MARYLAND

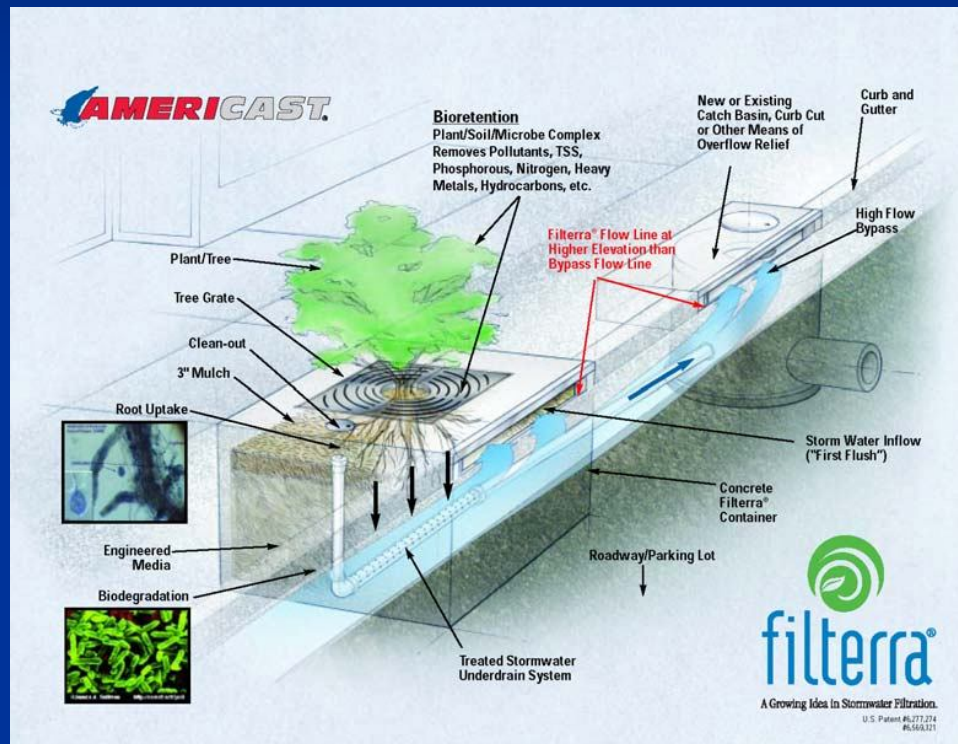
CPI Charles P. Johnson & Associates, Inc.
Civil and Environmental Engineers • Planners • Landscape Architects • Surveyors
1710 Elbow Rd., Box 300 Silver Spring, MD 20910 Tel: 301.424.5000 Fax: 301.424.4994
www.cpi.com • Gaithersburg, MD • Frederick, MD • Stevenson, MD • Fairfax, VA

CLIENT	PROJECT	DATE	SCALE
MONTGOMERY COUNTY DEPARTMENT OF TRANSPORTATION AND HIGHWAYS 1710 Elbow Rd., Box 300 Silver Spring, MD 20910 www.montgomerycountymd.gov	CE - CURB EXTENSION - IN STREET RETROFIT	10/1/2009	1"=30'
DESIGNED BY	DRAWN BY	CHECKED BY	IN CHARGE
DATE	DATE	DATE	DATE
10/1/2009	10/1/2009	10/1/2009	10/1/2009

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Tree Boxes



White Oak Library



Protecting Streams from Urban Trash

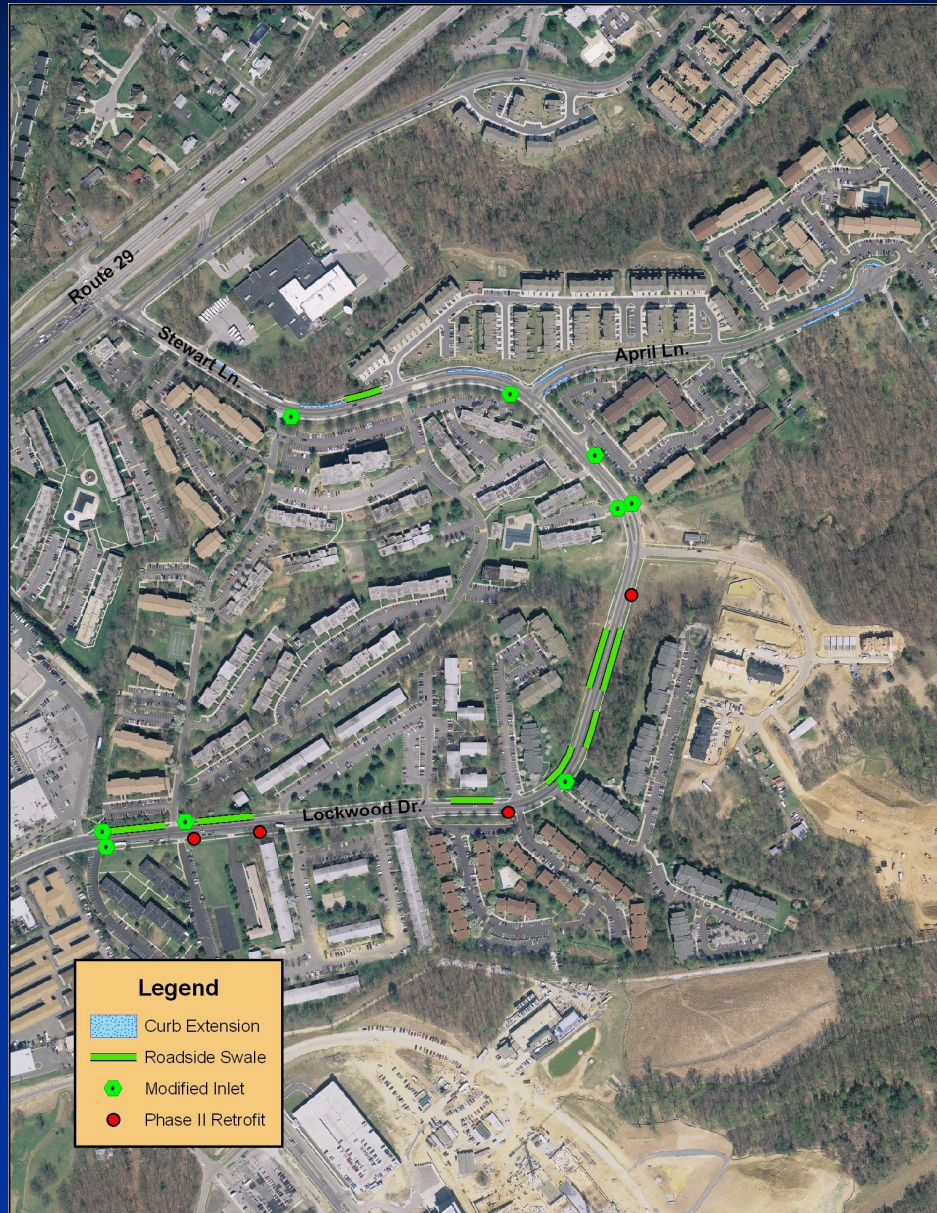
- Objective to prevent trash from entering streams through:
 - Education
 - Street Sweeping
 - Trapping in inlets
- Potomac River Watershed Trash Treaty – Signed in 2005 calls for a trash free Potomac River by 2013.

High Loadings of Trash & Organic Debris to Curb Inlets



Stormwater Retrofit in White Oak

Lockwood Drive, Stewart and April Lane



- **Total of 29 Structures:**
 - 7 Curb Extensions
 - 11 Roadside Bioswales
 - 10 Modified Inlets
 - 1 Filterra Tree Box
- **All Structures Combined Will Treat 11 Acres of Imperviousness**
- **Construction of Phase I is Expected to Begin This Fall**

Questions ?